

Rapid Prototyping Computer System Report

Software Infrastructure Group

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1 Function Requirements

1.1 Challenge

The Children's School at CMU challenged the Rapid Design and Prototyping for Computer systems class to:

- Help track the locations and activities of all members of the school
- Help make dismissal an easier and less stressful process

The whole class discussed together and had a vision scenario. According to the Human Computer Interaction Group, we have known the functions we need to implement and the other requirements we have to complete for connections with other group.

1.2 Functional Requirements

1.2.1 Client Requirements

1. Show the information to the parents and the teachers
2. Provide user control, for example: log in/out
3. Provide message service, send and receive message or notification between teachers and parents
4. Show the result of data analysis, or the graph of data visualization
5. Provide a list of children need to be dismissed to teachers

1.2.2 Implementation Requirements

Our group member compared the mainstream database, programming language, server and decided the ones which suit the situation most.

1. Read and send data from database
2. Provide API to Data Visualization Group to show the result

2 Feature Comparison

Our group member compared the mainstream database, programming language, server and decided the ones which suit the situation most.

2.1 Database

SQLite is very small and fast. So it is very good for a mobile phone. Besides, SQLite can be applied to WEB and APP, which others can't. Finally we choose SQLite.

2.2 Programming Language

Each of us have different skills. So we divide the work into PC, APP and website. We use C# to make a executable program in PC, use Java to make APP and use HTML, css, JavaScript to make the website.

Database	Cost	Platform	Company	Language	Character
SQLite	Free	Windows, Linux, Unix	D. Richard- Hipp	Tcl, C#, PHP, Java	Small, Fast
MySQL	Free	Windows, Linux, Unix	MySQL AB	PHP, Perl, Python	Open source, Small, Mediocre on- line support
Oracle	Expensive	Windows, Linux, Unix	Oracle		
SQL Server	\$931	Windows, Linux, Unix	Microsoft	XML	Safe, Effi- cient, Smart, Big

Table 1: Database Comparison

Language(Framework)	MVC Frame- work	Testing Framework	Security Framework	Licence
C++(CppCMS)	Yes	No	Yes	MIT
Spring	Yes	Mock Ob- jects, Unit tests	Spring Secu- rity	Apache 2.0
Python(Django)	Yes	Yes	Yes	BSD

Table 2: Programming Language Comparison

Server Type	Price	Storage	Security & Stability
Local Server	15k(New Server)/Free(PC)	Local Hard Disk	Fair
Cloud Server	22.50/M	0.24/GB/M	High

Table 3: Server Comparison

2.3 Server

Cloud Server is maintained by professional team, thus has better Security. However, a PC owned by child school can bear almost all of the tasks and it's free. So we select Local server, since it could fulfill our demands, and is much cheaper.

3 Implementations & Various Ends

We designed various ends to fulfill different demand. We will first explain details of implementation for each function requirement, and then show interfaces of each end.

3.1 Login

Different users have different different levels of authority. Software stores user information in database, retrieve them when users login, finally redirect to different dashboard page based on their identity.

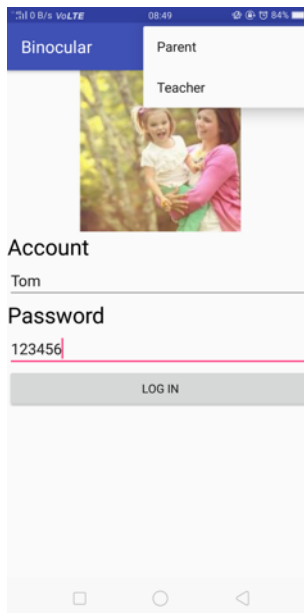


Figure 1: Android End

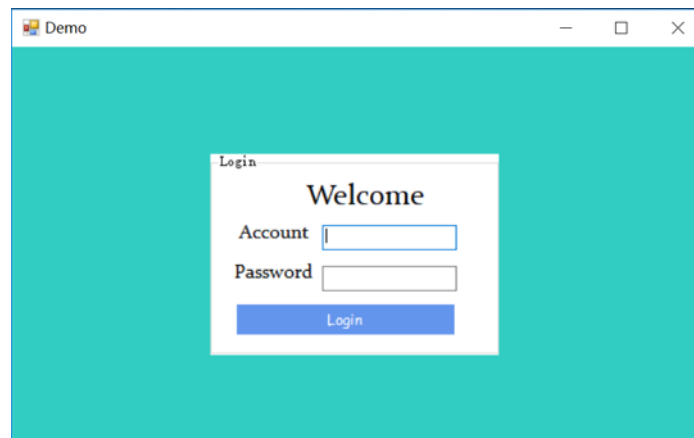


Figure 2: PC End

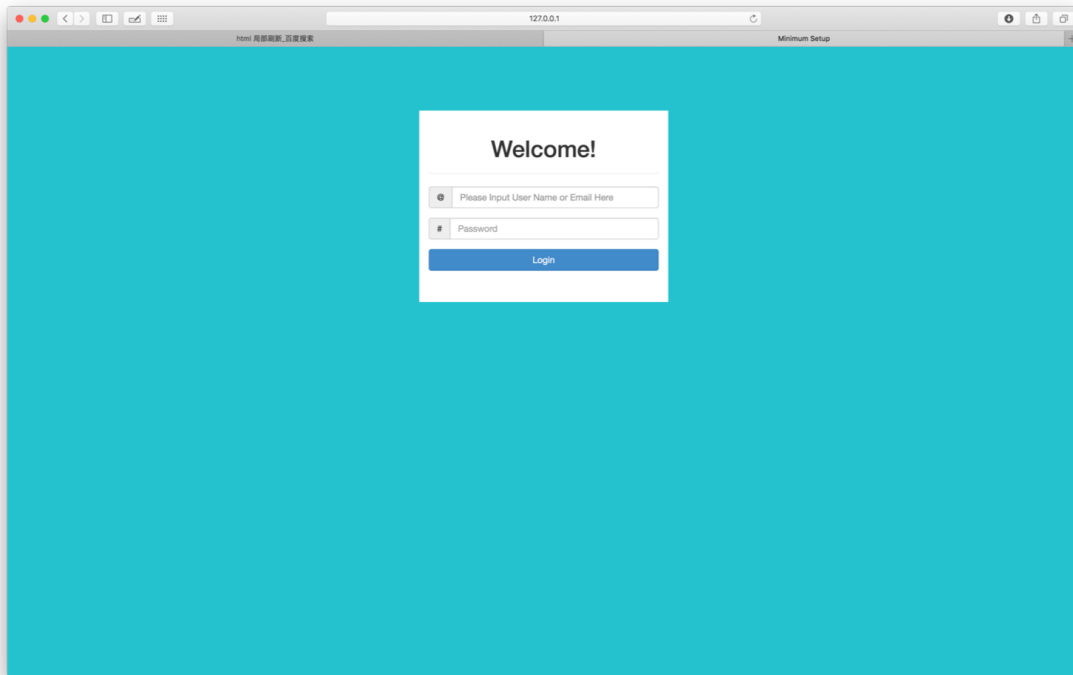


Figure 3: Web End

3.2 Dashboard

This page displays tables and graphs generated by data visualization group. Web end application uses JavaScript. Script runs when page loads, and displays graphs on the webpage.

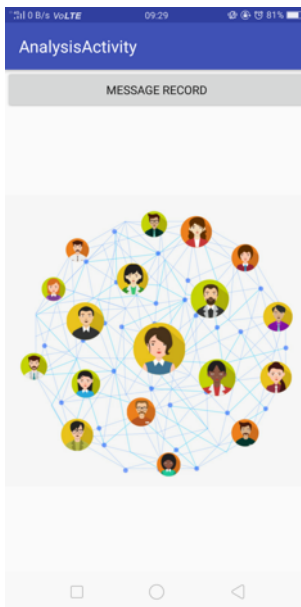


Figure 4: Android End

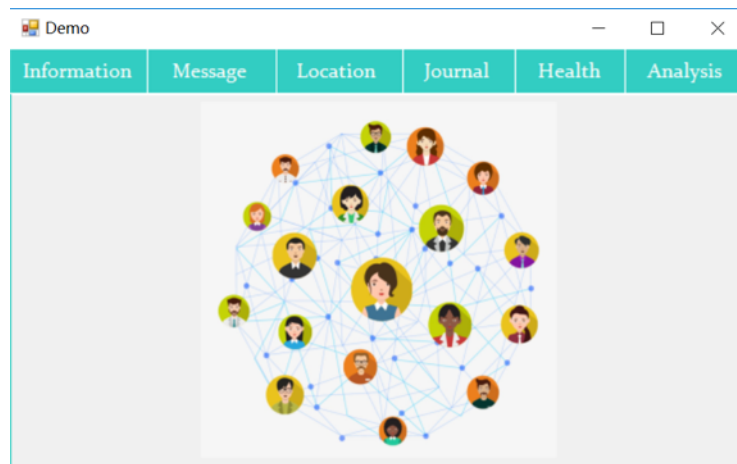


Figure 5: PC End

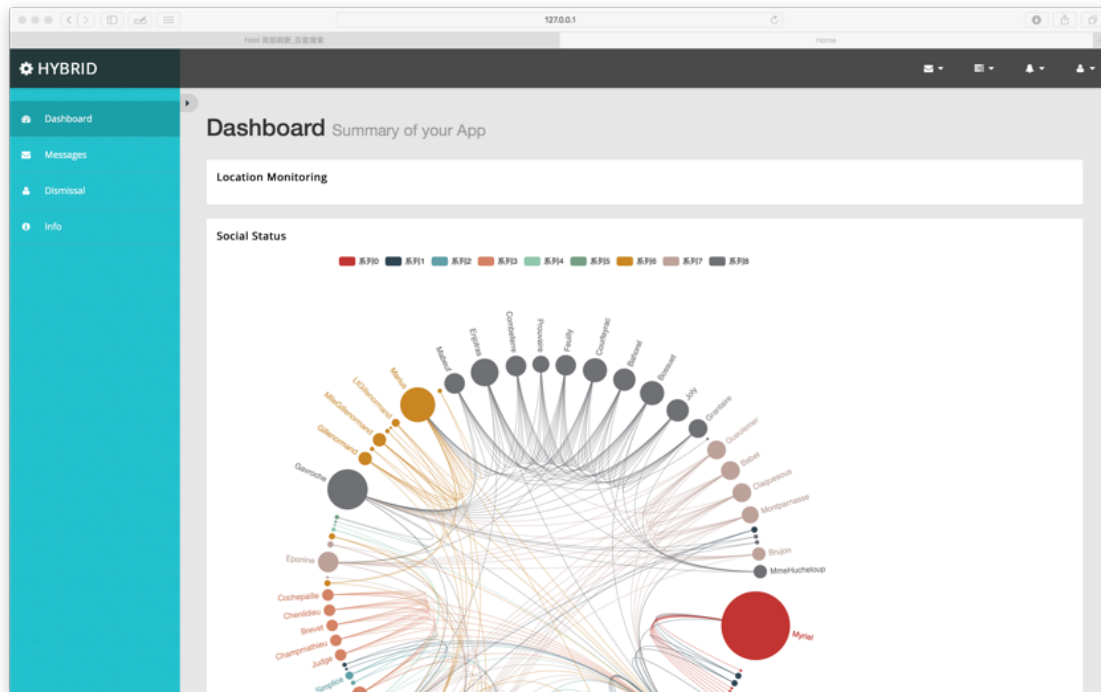


Figure 6: Web End

3.3 Dismissal

Dismissal is a dynamic queue showing children to be dismissed. Dismissal team get notified when parents arrive at parking lot, and a message containing plate number, and parent information will be written into database. Our software read message from database and display corresponding child name on the screen. When a child arrive at waiting area, a sensor detects the child's arrival and write another message containing child's information into database. The software then marks the child as 'Picked up' and remove him/her from the list.

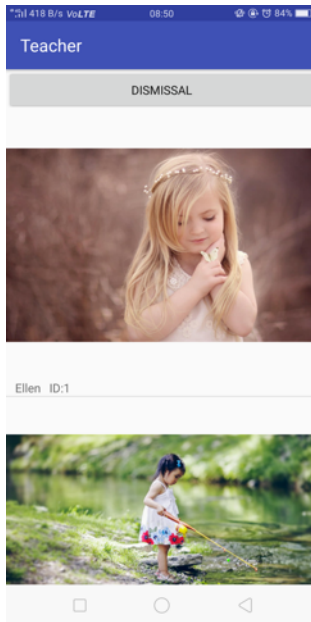


Figure 7: Android End

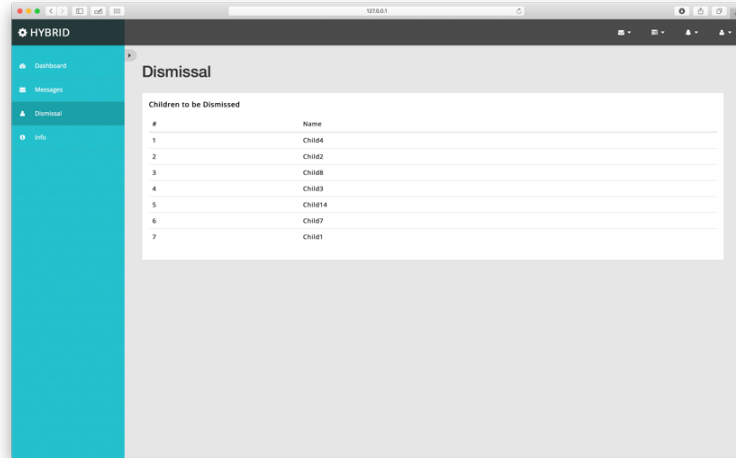


Figure 8: Web End

3.4 Message

The message modular allow parents and teachers to communicate through the software, exchanging the information of the children. When a user send a message to another user, the message will be stored in the database. And when a user enter the message page, the software will fetch messages sent to him/her from the database and show them in the page.

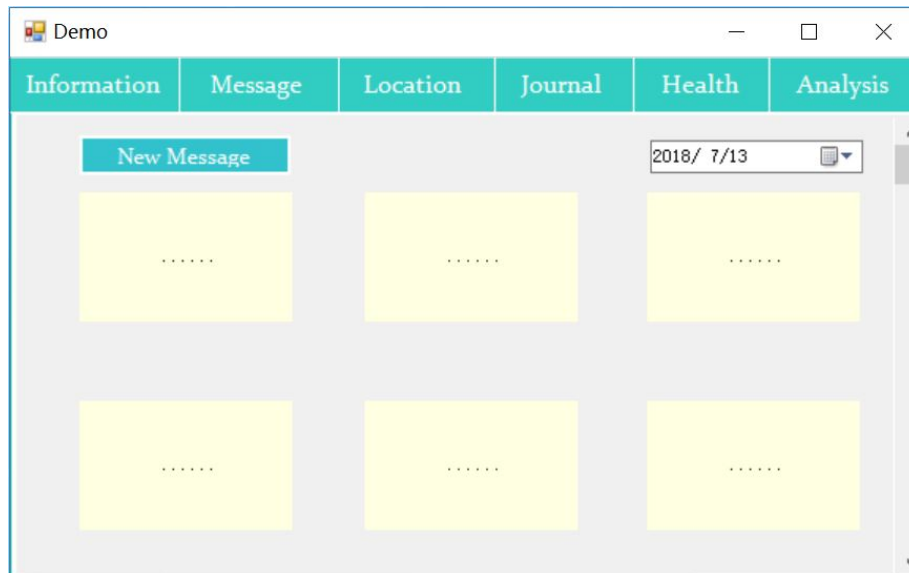


Figure 9: PC End

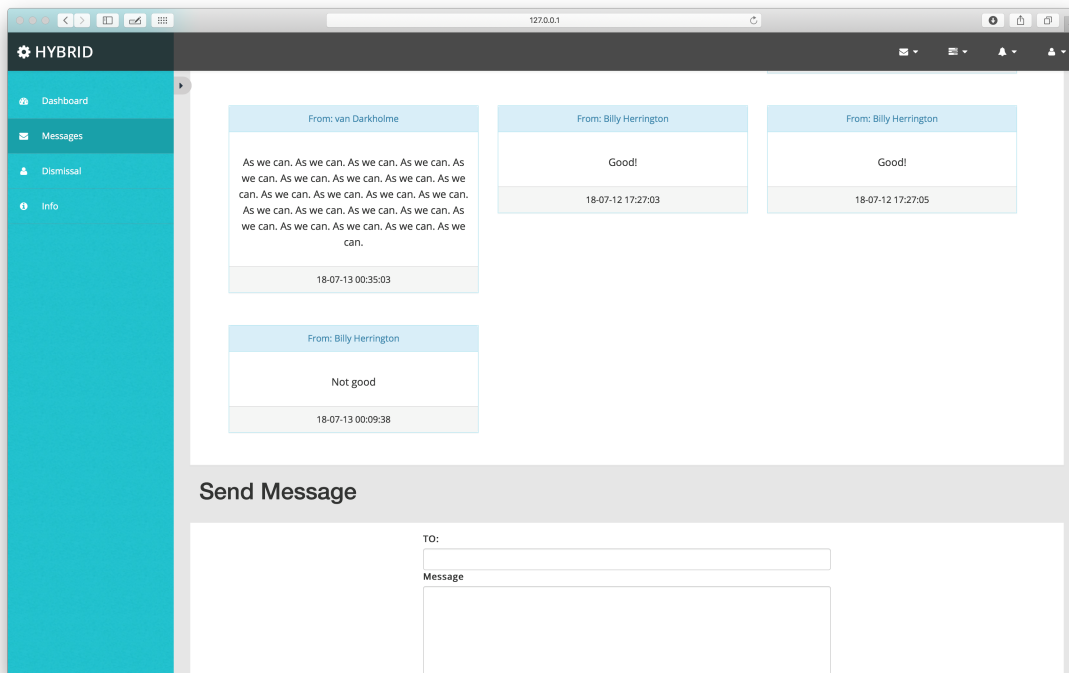


Figure 10: Web End

3.5 Personal Information

The personal information page shows the information of current user and his/her child. Information presented contains name, address, E-mail address, etc.

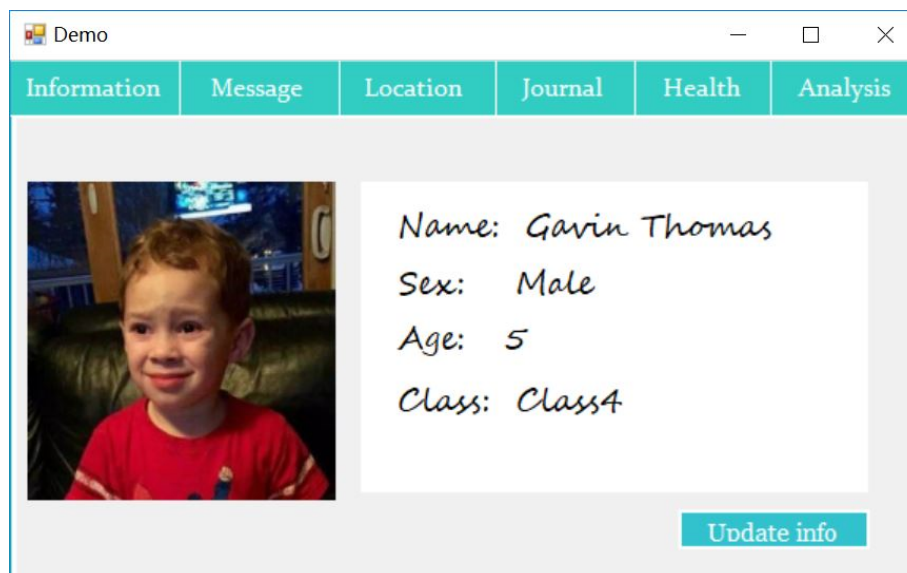


Figure 11: PC End

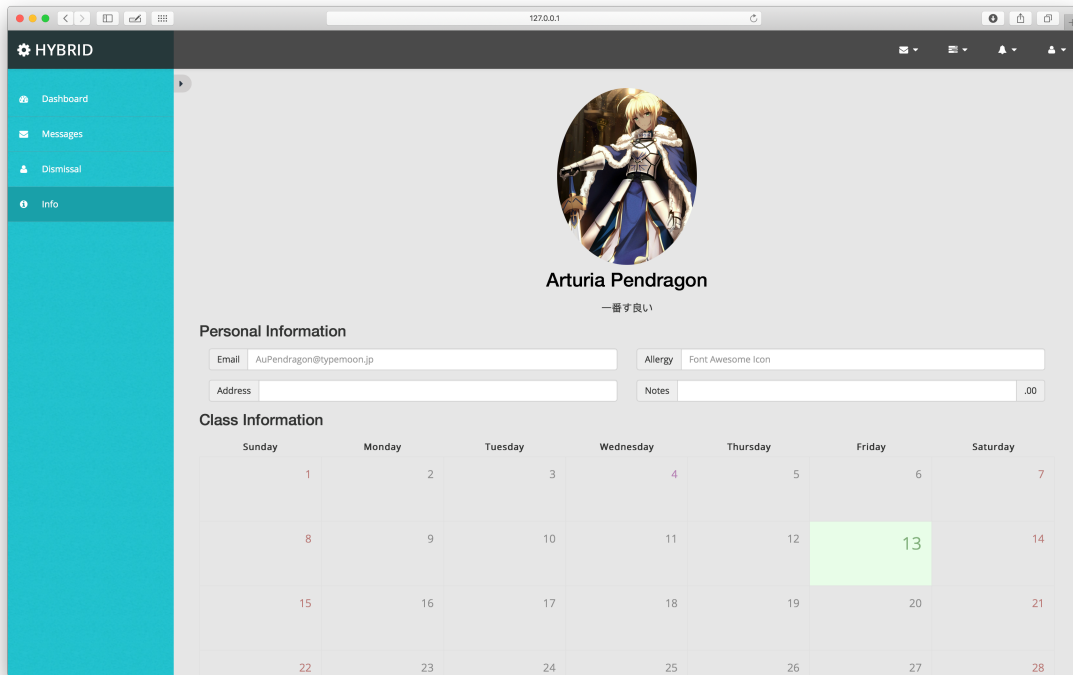


Figure 12: Web End

4 Individual Contribution

4.1 Wanjun Xu

- Completed most part of the report
- Developed PC App

4.2 Wenjia Liu

- Made group presentation
- Developed Android App

4.3 Anjie Wang

- Revised report
- Set up local server
- Developed backend for web app

4.4 Hanxiang Ren

- Revise report
- Develop frontend for web app

5 Lessons Learned

This is the first time for us participating in this kind of class. Be aimed at solving a specific problem in real life, we are required to design a prototype and implement it by different groups' cooperation. It's a really fresh experience to everyone of us.

The most significant problem we encountered is communication. Since our team does not work with data collected from sensor group directly, we think it's a better way for data analysis group, data visualization group, sensor to discuss format of each database. But, at the very beginning, this task was assigned to our group. and we failed to present our thoughts and concerns to HCI group, and that caused a lot trouble when cooperating with other group.